

Chapter 7.1

Hearing conservation

This could be you . . .

A worker didn't think it was important to use hearing protection while working with equipment that produced high levels of noise, so usually "forgot" to wear any hearing protective devices. He eventually noticed that conversations seemed quite muffled and unclear, and that he had an annoying ringing in his ears. He then learned that his hearing problem was permanent and could not be improved with surgery or medication.

1. Applicability of this chapter

You are required to follow this chapter if you work in an area that has been designated a hazardous noise area or source, such as the flight line at Ellington Field or machines in a sheet metal shop.

2. What this chapter covers

This chapter covers the minimum requirements for JSC's hearing conservation program (HCP). It discusses JSC's efforts to prevent noise-induced hearing loss among employees who are exposed to hazardous noise while working at this center. JSC managers, supervisors, and employees share responsibilities for meeting these requirements.

3. Policy

These documents govern JSC's hearing conservation policies:

- a. NPR 1800.1 Chapter 4.9 describes the general requirements and provisions of NASA's HCP.
- b. 29 CFR 1910.95, "Occupational Noise Exposure," and its appendices describe OSHA's hearing conservation standards.
- c. 29 CFR 1904.10, "Occupational Injury and Illness Recordkeeping and Reporting Requirements," describes OSHA's requirements for recording and reporting noise-related hearing loss.

4. HCP elements

The success of the JSC HCP requires support from managers, medical personnel, supervisors, and employees in conduct of:

- a. Buy Quiet and Quiet by Design program and noise control requirements and strategies.

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- b. Noise exposure monitoring.
- c. Medical surveillance and audiometric testing.
- d. Selection, use, and inspection of hearing protectors.
- e. Training.
- f. Policy, documentation, and recordkeeping.
- g. Effective implementation of engineering, operational, and administrative controls.
- h. Appropriate corrective actions for employees who violate any HCP requirements.

5. What is “too noisy”

NASA’s hearing conservation policy considers occupational noise to be potentially hazardous to hearing if the exposure is greater than the equivalent of 82 decibels on the A-weighted scale (dBA) over an 8-hour time-weighted average (TWA_{8hr}). This is the JSC “action level.” Noise exposures greater than the equivalent of 85 dBA TWA_{8hr} exceed JSC’s “criterion level.” The following apply:

- a. You shall be enrolled in the JSC HCP whenever you are exposed to:
 - 1. Noise levels that exceed the JSC action level of 82 dBA TWA_{8hr} for 30 or more days per year.
 - 2. Noise levels that exceed the JSC action level of 85 dBA TWA_{8hr} for 1 or more days per year.
- b. This table shows exposures to the JSC action level and permissible level. As noise levels increase, it takes less time to get the same exposure.

<i>Decibel* limit</i>	<i>NASA Action Level (Duration in hours)</i>	<i>NASA Permissible Level (Duration in hours)</i>
82	8	16
85	4	8
88	2	4
91	1	2
94	0.5	.1
97	0.25	.5
100	0.13	.25
103	0.06 or less	0.13

*Measured in dBA, with sound level meter set at “slow response.”

- c. For impact and impulse noise, “too noisy” is anything that exceeds 140 dB peak sound pressure level.

- d. Under no circumstances are you to be exposed to noise exceeding 85 dB continuous noise or 140 dB impulse or impact noise without personal hearing protection devices (HPDs).

6. How to determine whether your work area is too noisy

The easiest way to know if your work area is too noisy is to check for hazardous-noise warning signs posted just outside the hazard areas or for warning labels on power tools or machines. If you have to shout at someone 3 feet away from you to make yourself understood, the levels in that area may be exceeding 82 dBA. If you think your work area or machinery may be noise-hazardous but no warning signs or labels are present, call the Occupational Health Department at (281) 483-6726 for noise monitoring support. The Occupational Health Department will complete the monitoring and report back to you in writing with their findings and recommendations. If your work area is too noisy, you will be notified that you may be included in the hearing conservation medical monitoring program (see paragraph 10 of this chapter).

7. Selection, use, and inspection of HPDs

You shall wear HPDs, such as earmuffs or ear plugs if you are exposed to continuous noise that equals or exceeds 85 dBA, independent of duration of exposure or impulse noise that equals or exceeds 140 dB peak. HPDs will also be available for use by employees working in areas with nuisance noise levels, lower than 82 dBA TWA_{8hr} . The follow requirements apply to HPDs:

- a. You shall never trade or share earplugs. They are for your exclusive use only.
- b. HPDs shall attenuate employee noise exposure to an TWA_{8hr} of 85 dBA or less. For employees who have shown a standard threshold shift (or STS, as described in paragraph 10), HPDs shall attenuate exposure to an TWA_{8hr} of 82 dBA or less.
- c. To determine the necessary noise reduction rating (NRR) of the manufacturer for any kind of HPD in a noisy environment, you shall use the following formula:
 - 1. Required $NRR = [(L_A - 85) \times 2] + 7$, where L_A is the measured ambient sound level to which the employee is exposed.
 - 2. You shall reevaluate the adequacy of HPD attenuation whenever employee noise exposures increase.
- d. You shall regularly inspect special HPDs if they are used in hazardous noise areas.
- e. You shall never use earmuffs or sound-suppression and noise-cancellation headsets that have been damaged, altered, or modified in any way that affects the attenuation characteristics.
- f. The Occupational Health Department can recommend the best types of hearing protection to wear in a noise-hazardous area.

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- g. The Occupational Health Department may reevaluate noise-hazardous areas whenever the noise level increases to see whether current HPDs are still adequate.
- h. You shall wear double protection (both earmuffs and earplugs) when analysis shows that the protection provided by earplugs doesn't reduce noise exposures below 85 dBA (TWA).

8. Engineering, operational, and administrative controls

You shall follow these requirements to control noise:

- a. Consider noise engineering control measures in the early stages of the design or planning process of engineering projects, drawings, and operational plans, and before contract award or authority to proceed. These controls should aim to reduce noise levels below 82 dBA.
- b. If you plan to change facilities, operations, or procedures, you shall notify the JSC Occupational Health Office of:
 - 1. Changes in operations or equipment that increase noise levels.
 - 2. New, uncontrolled, or previously unidentified areas, operations, or equipment that may produce hazardous noise or may not meet the requirements of this chapter.
- c. If engineering controls fail to reduce sound levels and hearing protective equipment is not sufficient to attenuate noise to less than 82 dBA, you shall use:
 - 1. Administrative controls. These controls may include limiting the duration of time spent in, or control of access to, the noise-hazardous area.
 - 2. Operational controls, such as maximizing distances between the employee and the hazardous noise source, when practical.

9. “Buy Quiet and Quiet by Design” Program

The “Buy Quiet and Quiet by Design” Program aims to reduce employee noise exposures through early consideration of the noise outputs of systems, facilities, and equipment before their purchase and design. JSC designers and engineers should consider noise emissions when purchasing and designing equipment that is expected to generate noise emission levels of concern for hearing conservation (80 dBA and higher). The JSC “Buy Quiet and Quiet by Design” Program shall:

- a. Be integral to the site selection and design of new or modified facilities and equipment.
- b. Meet realistic and achievable baseline noise criteria and optimize noise emission criteria based on individual and specific operational and site conditions.
- c. Encompass design and development, or selection and purchase, of a broad variety

of fixed and portable equipment purchased for use by JSC organizations, including equipment purchased by contractors, to minimize noise-exposure hazards to personnel.

- d. Encompass equipment expected to produce noise that is approaching hearing conservation levels of 80 dBA and higher under a variety of site and operational considerations.
- e. Identify noise emission and control requirements for equipment procurement specifications and design.
- f. Contain provisions for “Buy Quiet and Quiet by Design” program support, promotion, training, and management sponsorship.
- g. Be individualized to meet an organization’s specific needs, configuration, and other relevant factors.
- h. Not apply to specialized research project items or flight hardware, which may be expected to produce large amounts of noise.
- i. Be included in all contracts and in the purchase of new equipment, as appropriate. Contracting Officers and Contracting Officer’s Technical Representatives shall ensure that these provisions are included.

10. Medical surveillance and audiometric examinations (hearing tests)

You shall be included in the HCP medical surveillance program and receive periodic audiometric examinations if you are exposed to noise levels that exceed the NASA action level of 82 dBA TWA_{8hr} for at least 1 day. There are three types of exams:

- a. *Baseline exam.* Within 30 days of initial exposure to hazardous noise, noise-exposed employees should receive a baseline medical examination. Results of subsequent hearing tests will be compared to the results of the baseline hearing test. The baseline exam shall follow these requirements:
 - 1. Include a hearing test (preceded by at least 14 hours without high noise exposures).
 - 2. Include a medical examination to determine any preexisting ear problems.
 - 3. Include a noise exposure history to document past noise exposures.
 - 4. Occupational health personnel will review the hearing test results and may recommend a referral to an audiologist or s physician for further evaluation.
 - 5. The employee and his or her supervisor shall receive a written notification of any hearing condition that may impair the employee’s ability to safely hear commands or signals on job.
 - 6. If a contract is awarded to a new contractor and the same employee of the former employer occupies the same work role position, without an appreciable change in noise exposure, continue to use the original audiometric baseline.

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- b. *Annual exam.* Noise-exposed employees shall, at least every 12 months, receive an audiometric exam that includes:
 - 1. A hearing test (no special provisions for avoiding noise are needed).
 - 2. An update to their exposure and medical history.
 - 3. An evaluation for an STS. If a decline in hearing threshold of 10 dB (average) or more from baseline thresholds at 2000, 3000, and 4000 Hz in either ear is found in the annual audiometric examination, additional testing is required.
- c. *Final (termination) exam.* If you have participated in the HCP medical surveillance program, you shall receive a final audiometric exam before ending employment, transfer to duties not involving noise exposures, transfer to another installation, or retirement. If an annual audiogram has been completed within 6 months of the termination, transfer, or retirement date, those results may be used.

11. Hearing conservation training

If you are exposed to noise at or exceeding the NASA action levels (see paragraph 5 of this chapter), you and your supervisor shall receive annual training from the Occupational Health Department in the hazards of noise exposure to include:

- a. Elements of JSC's HCP.
- b. The roles and responsibilities of noise-exposed employees.
- c. Effects of hazardous noise on and factors that may contribute to hearing loss.
- d. Hazardous noise sources in the employee's JSC work areas.
- e. Noise control practices, including use of hearing protection during home activities.
- f. The purpose, types, fitting, proper use, advantages and disadvantages, and maintenance of HPDs.
- g. An explanation of Occupational Health Department's audiometric testing purpose and procedures.

12. HCP records

The following recordkeeping requirements apply to JSC's HCP:

- a. Supervisors shall maintain a registry of personnel enrolled in their activity's hearing conservation program. Forward an updated listing of these personnel to JSC Occupational Health Department once per quarter.
- b. The Occupational Health Department shall maintain JSC's comprehensive registry of all noise-hazardous areas and personnel placed in the JSC Hearing Conservation Program. This includes a database of audiometric test records, audiometer calibration data, noise level surveys, noise-exposure assessments, and hearing conservation training records

- c. An employer shall log any STS (using age corrections for the hearing loss) as an OSHA-recordable event on the OSHA 300 log per 29 CFR 1904.10 and NPR 1800.1 if both of the following are true:
 - The hearing loss now exceeds 25 dB (when averaging hearing thresholds at 2000, 3000, and 4000 Hz) in the same ear.
 - The hearing is determined to be work related.

13. Other potential noise exposures

In addition to noise exposures at work, your activities off the job may also cause hearing loss. Some of these activities include:

- a. Motorized vehicles and equipment such as: motorcycles, boats, lawn mowers, and power tools (saws, drills, etc.).
- b. Recreational use of fire arms.
- c. Audio equipment such as: radios, televisions, and musical instrument amplifiers if the volume is set too high.
- d. Attendance at concerts and night clubs.